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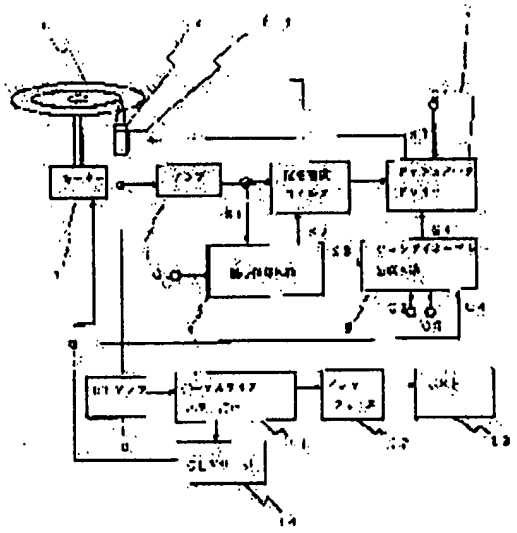
(54) OPTICAL DISK DEVICE AND OPTICAL DISK DRIVING METHOD

(57)Abstract:

PROBLEM TO BE SOLVED: To improve the random access stability of data and the speed in optical disk memory devices such as a CD-ROM drive.

SOLUTION: In an optical disk track servo mechanism, the device is provided with an eccentricity detecting circuit 8 which discriminates the direction of the eccentricity of a disk and acceleration from the conditions of track error signals when a track jump command is generated and a track jump enable signal generating circuit 9 which determines the track jump start timing from the obtained eccentricity condition, the track jump direction, the number of jumps and the relationship with the present disk number of revolutions. Having these circuits 8 and 9, a jump is executed with an optimum timing against the disk eccentricity. Note that the stability and the sureness of a track jump are improved because the track jump is conducted by observing the conditions of the optical disk eccentricity (the acceleration and the direction) and waiting for the execution of the jump till the size and the direction of the optimum eccentricity acceleration are obtained.



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CLAIMS

[Claim(s)]
[Claim 1] To the extent that the truck error signal generating circuit which generates a truck error signal, and phase compensation of this truck error signal are carried out A phase compensating filter, In the optical disk unit which has a means to drive an actuator so that said truck error signal may be set to 0 based on the output of this filter An eccentric detection means to detect the sense and acceleration of eccentricity of a disk based on a truck error signal, and to output this eccentric information in response to the command which jumps a truck, A track jump enable signal generating means to generate the track jump enable signal which shows track jump initiation timing based on this eccentric information, the direction of a track jump, and a current disk rotation period, The optical disk unit characterized by receiving this track jump enable signal and having the jump signal generating circuit which generates the jump signal which carries out movable [of said actuator].
[Claim 2] Said jump command is an optical disk unit according to claim 1 characterized by generating the track jump enable signal which shows said track jump initiation timing based on this count information of a jump including the count information of a jump.
[Claim 3] The truck zero cross comparator which carries out the party rate of said truck error signal with signal level in case the beam spot of an optical pickup is on a truck, and generates a binary-ized signal, It has a gain down signal generating circuit at least for the above to lower the gain of the servo band of a phase compensating filter, and enlarge the amplitude of this truck error signal in response to said track jump command. By gain down, with this truck zero cross comparator, carry out the party rate of the truck error signal to which the amplitude became large, and it is made binary. The optical disk unit according to claim 1 characterized by having said eccentric detecting circuit which acquires said eccentric information on a disk from the level of the truck zero cross signal after a party rate, and an edge.
[Claim 4] An optical disk unit including said eccentric detecting circuit which at least the above carries out adjustable [of the frequency response characteristic of a phase compensating filter], has the hold signal generating circuit which holds the control signal to said truck actuator, and the sample circuit which samples the value of the truck error signal produced by holding an optical pickup with a fixed time interval, computes the condition of eccentricity in response to said track jump command from the variation and the sampling time of the truck error signal by which the sample was carried out, and outputs said eccentric information according to claim 1.
[Claim 5] Were set based on said jump direction, said number information of jump trucks, and spindle rotation period information. It has a storage means to memorize the range data of the magnitude of eccentric acceleration and the range data of the eccentric direction suitable for a track jump as a window. The optical disk unit according to claim 1 or 3 characterized by including said track jump enable signal generating circuit which generates a track jump enable signal when said eccentric acceleration which said eccentric detecting circuit outputs, and said eccentric direction enter in a predetermined window.
[Claim 6] To the extent that the truck error signal generating circuit which generates a truck error signal, and phase compensation of this truck error signal are carried out A phase compensating filter, In the

drive approach of an optical disk of having a means to drive an actuator so that said truck error signal may be set to 0 based on the output of this filter In response to the command which jumps a truck, based on a truck error signal, detect the sense and acceleration of eccentricity of a disk, and this eccentric information is outputted. The track jump enable signal which shows track jump initiation timing based on this eccentric information, the direction of a track jump, and a current disk rotation period is generated. The drive approach of the optical disk characterized by receiving this track jump enable signal and generating the jump signal which carries out movable [of said actuator].

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] About the random access method of optical disk memory equipment, this invention eliminates the effect of a tracking servo device, especially the disk eccentricity at the time of jump initiation as much as possible, and relates to the approach of making an optical pickup jumping to stability and the target truck certainly.
[0002]
[Description of the Prior Art] The track jump method of conventional optical disk memory equipment is explained using drawing 1 and drawing 7 . Drawing 1 shows the outline configuration of a drive of CD-ROM which is optical disk memory equipment only for playbacks. 1 is an optical disk, and as a list of the pit where minute die length is different, from disk inner circumference, digital information is missing from a periphery and is spirally recorded on this disk, an optical pickup 2 amplifies the reflected light from the disk of a laser diode with a photodiode, amplifies reception and it with amplifier, and it is reproducing data. RF amplifier 10 amplifies the output of the photodiode of an optical pickup, and passes it to a data slice and the error correction block 11. CD-ROM is performing rotational-speed control called the CLV servo which keeps the linear velocity of a disk constant, in order to read data to the inner circumference of a disk, and a periphery with ****** and a fixed data rate. The CLV servo 14 outputs the signal C4 which controls a spindle motor so that reception and the data period read become fixed about the signal from a data slice and an error correction block to a spindle motor. The data after an error correction go into the interface block 12 with a host with a data slice and an error correction block, and data are outputted to a host computer 13 according to a specific format.
[0003] However, as an error on a disk and manufacture of a drive, in CD-ROM, there is no revolving shaft of a disk strictly centering on a disk, and it has in it the eccentricity below the value which becomes settled by specification. Although fine cut in the shape of a spiral toward the periphery from the most inner circumference in fact, since distance with the next truck is very detailed, they are explained that the data tracks minced on the disk have the shape of a concentric circle centering on a revolving shaft in approximation. It sees from an optical pickup, and the truck will be observed [when the data tracks of a certain arbitration were observed with the view which stood it still to the earth and a disk rotates at high speed] as it is vibrating the rotation period to radial, without being visible with one stationary line, as shown in drawing 7 , since the revolving shaft has eccentricity.
[0004] In CD-ROM, disk radial truck spacing is 1.6 micrometers, and since the maximum eccentricity defined by specification is **70 micrometers or less, the truck of ten numbers per rotation will cross an optical pickup by the eccentric component. So, in order to reproduce data, rotating a disk and tracing one truck, the truck servo for making an optical pickup follow the target truck is needed.
[0005] The amplifier of 3 generates S1 for the truck error signal which shows the error of which the reflected light of a disk is calculated and a laser spot has from the target truck, and inputs at least that of 4 into a phase compensating filter. Since the transfer characteristics of the actuator 6 to which it carries out movable [of the optical pickup] are behind [180 degrees] in the phase in the point that a loop gain

is set to 0dB, the way things stand, a system is not stabilized by them. Then, at least that of 4 advances the phase in the frequency from which gain is set to 0dB with a phase compensating filter, and is maintaining the system at stability. Moreover, the role which raises the loop gain of a band which wants to oppress a truck error signal is also played. The actuator driver of 5 generates the drive signal S5 for carrying out movable [of the actuator 6 of reception and an optical pickup] for the output of the phase compensating filter 4.
[0006] With the drive signal S5, an actuator 6 carries out movable to radial [of a disk] so that a truck error signal may be oppressed, and it performs actuation which is always followed to the target truck by continuing the above actuation.
[0007] In this CD-ROM equipment, in order to access the target data, the device which jumps a truck is established by moving an optical pickup to the disk radial by the command from a control means (not shown). Generally, although the actuator which carries out movable [of the optical pickup] to the disk radial in CD-ROM equipment has two lines of the rough actuator (the movable range of about 30mm) which slides an optical pickup to the disk radial in order to reproduce the data currently spirally recorded as the energy actuator (about 100 micrometers of movable range of numbers) for following eccentricity, especially by explanation of this invention, it is not distinguished but only let it be an actuator.
[0008] Generally a track jump is performed by the following actuation. Truck servo actuation is temporarily interrupted by the track jump command from a control means, and an actuator driver generates the kick signal which moves the actuator of an optical pickup in disk inner circumference or the direction of a periphery. If an actuator operates and an optical pickup begins to move to the disk radial, counting of the number of trucks crossed from the wave of the truck error signal under pickup migration and a data signal will be carried out. If it judges that it reached to the target truck from the number of trucks by which counting was carried out, truck servo actuation will be resumed and reading of data will be begun.
[0009]
[Problem(s) to be Solved by the Invention] However, by the approach of the conventional track jump, since the direction of the truck horizontal end rate by disk eccentricity became large depending on [passing speed / of an optical pickup] the timing of track jump initiation to increase of the disk eccentricity accompanying improvement in the speed of disk rotational speed, the optical pickup may have moved contrary to the direction to carry out an appearance top track jump, and the phenomenon which does not reach to the target truck may have arisen. In this case, disk data must be read again, a jump must be redone and the problem that arriving at the target truck as a result will take time amount is produced.
[0010] The rotational speed of a disk is also accelerated with the twice of digital audio playback, 4 times, and 8 times as CD will accomplish evolution from digital audio playback to the application as data-logging media for multimedia in recent years, if CD (compact disk) is taken for an example. Since rotational-speed control called the CLV servo which keeps the linear velocity of a disk constant in order that CD may read data to the inner circumference of a disk and a periphery with ****** and a fixed data rate is performed, when the optical pickup is tracing the truck near the most inner circumference of a disk, the rotational speed of a disk becomes a high speed most. Although the maximum eccentricity is not dependent [the angular velocity of disk rotation], and fixed when reproducing data by one 8 times the data transfer rate of this to the data transfer rate for the usual digital audios, it depends for the maximum eccentricity acceleration on rotational angular frequency. That is, eccentricity and eccentric acceleration are expressed with the following formulas. xo shows the maximum eccentricity displacement.
[0011]
Variation rate X=xo-sinomegat (1)
Eccentric acceleration d2 x/dt2=-xo-omega 2sinomegat=-omega2x (2)
an upper type -- eccentricity -- it turns out that the relation between a variation rate and change-of-mind acceleration serves as a sine wave from which a phase differs 180 degrees. When 140 micrometers and disk linear velocity at the time of the usual digital audio playback are carried out for the maximum

eccentricity in 1.4m/s here, the angle-of-rotation frequency in the disk most inner circumference is as follows.
[0012] omega=2pif= linear velocity / most-inner-circumference radius = depending 1.4/0.025=56, the maximum eccentricity acceleration serves as d2 x/dt2=562 and 140e-6=0.44 m/s2.
[0013] Moreover, supposing it reads data by one 8 times the linear velocity of this, similarly, by the most inner circumference of a disk, it is set to omega=2pif=11.2/0.025=448 maximum eccentricity acceleration =4482 and 140e-6=28.1m/s2, and will have 8x8=64 time [of the very usual digital audio] eccentric acceleration.
[0014] Thus, if rotational speed of a disk is made high in order to raise a data transfer rate, in connection with it, eccentric acceleration will become large by the square. For this reason, the phenomenon which an optical pickup moves to eccentric acceleration, the sense to perform a track jump depending on the timing at the time of jump initiation, and the reverse sense may occur. Moreover, at the time of truck servo drawing in at the time of jump convergence, since a disk radial relative velocity of an optical pickup and a truck is too large, possibility that a servo cannot be drawn is also produced.
[0015] From the background mentioned above, by this invention, the effect of the eccentricity of the optical disk in the conventional track jump method is eliminated as much as possible, and how to perform a stable track jump is stated.
[0016]
[Means for Solving the Problem] In order to solve the above-mentioned technical problem, the optical disk unit and the optical disk drive approach of this invention The truck error signal generating circuit which generates a truck error signal, (Means 1) In the optical disk unit which has a means to drive an actuator so that said truck error signal may be set to 0 based on the output of a phase compensating filter and this filter to the extent that phase compensation of this truck error signal is carried out An eccentric detection means to detect the sense and acceleration of eccentricity of a disk based on a truck error signal, and to output this eccentric information in response to the command which jumps a truck, A track jump enable signal generating means to generate the track jump enable signal which shows track jump initiation timing based on this eccentric information, the direction of a track jump, and a current disk rotation period, The optical disk unit characterized by receiving this track jump enable signal and having the jump signal generating circuit which generates the jump signal which carries out movable [of said actuator].
[0017] (Means 2) Said jump command is the optical disk unit of the means 1 publication characterized by generating the track jump enable signal which shows said track jump initiation timing based on this count information of a jump including the count information of a jump.
[0018] The truck zero cross comparator which carries out the party rate of said truck error signal with signal level in case the beam spot of an optical pickup is on a truck, and generates a binary-ized signal, (Means 3) It has a gain down signal generating circuit at least for the above to lower the gain of the servo band of a phase compensating filter, and enlarge the amplitude of this truck error signal in response to said track jump command. By gain down, with this truck zero cross comparator, carry out the party rate of the truck error signal to which the amplitude became large, and it is made binary. The optical disk unit of the means 1 publication characterized by having said eccentric detecting circuit which acquires said eccentric information on a disk from the level of the truck zero cross signal after a party rate, and an edge.
[0019] In response to said track jump command, at least the above carries out adjustable [of the frequency response characteristic of a phase compensating filter]. (Means 4) The hold signal generating circuit which holds the control signal to said truck actuator, It has the sample circuit which samples the value of the truck error signal produced by holding an optical pickup with a fixed time interval. The optical disk unit of the means 1 publication including said eccentric detecting circuit which computes the condition of eccentricity from the variation and sampling time of the truck error signal by which the sample was carried out, and outputs said eccentric information.
[0020] (Means 5) Were set based on said jump direction, said number information of jump trucks, and spindle rotation period information. It has a storage means to memorize the range data of the magnitude

of eccentric acceleration and the range data of the eccentric direction suitable for a track jump as a window. The optical disk unit of means [which is characterized by including said track jump enable signal generating circuit which generates a track jump enable signal when said eccentric acceleration which said eccentric detecting circuit outputs, and said eccentric direction enter in a predetermined window] 1, or means 3 publication.

[0021] The truck error signal generating circuit which generates a truck error signal, (Means 6) In the drive approach of an optical disk of having a means to drive an actuator so that said truck error signal may be set to 0 based on the output of a phase compensating filter and this filter to the extent that phase compensation of this truck error signal is carried out In response to the command which jumps a truck, based on a truck error signal, detect the sense and acceleration of eccentricity of a disk, and this eccentric information is outputted. The track jump enable signal which shows track jump initiation timing based on this eccentric information, the direction of a track jump, and a current disk rotation period is generated. The drive approach of the optical disk characterized by receiving this track jump enable signal and generating the jump signal which carries out movable [of said actuator].

[0022]

[Function] The optical disk unit of means 1 and means 2 publication raises the stability of a track jump, and certainty by performing a track jump only after it takes in the truck error signal in front of a jump in the eccentric detection section first, and it observes the condition (acceleration and direction) of eccentricity, and waiting until it becomes in the eccentric rate magnitude and direction which become settled from the direction of a track jump make into the purpose, the number of jumps, and a current spindle rotational frequency and which are consider to are the optimal.

[0023] Moreover, if it is the track jump device of the disk unit by the optical method, and the range and direction of the optimal eccentric acceleration over the direction of a track jump, the number of jump trucks, and a spindle engine speed are beforehand set as the storage means (for example, thing as shown in a table), the certainty of a track jump can be increased in the optical disk unit of various methods.

[0024] Especially invention of means 1 publication has the track jump enabling circuit which generates the timing for performing a track jump from the information on the eccentric acceleration detected as the eccentric detecting circuit which detects the acceleration of disk eccentricity and the jump direction, the number of jumps, and a spindle engine speed from the truck error signal used by the tracking servo of an optical disk. This eccentric detecting circuit detects the magnitude and the direction of eccentric acceleration from a truck error signal, and outputs them to the track jump enabling circuit of the next step. A track jump enabling circuit outputs a jump enable signal so that it may jump to the timing which becomes settled from eccentric acceleration and the number of jumps, the jump direction, and a spindle engine speed and which cannot be most easily influenced of eccentricity.

[0025] Next, the eccentric detecting circuit in the optical disk unit of means 3 publication lowers the gain of truck servo system intentionally just before a track jump, and generates a truck error signal. The party rate of the truck error signal is carried out to after an appropriate time on the level at the time of an on-truck, and a truck zero cross signal is generated. This truck zero cross signal shows whether it is in a disk inner circumference side to the truck which the laser spot of an optical pickup is tracing in the condition that lower gain and servo actuation is performed, or it is in a periphery side. Moreover, the edge from which level changes to 1 to 0, or 0-1 shows having crossed the truck which the laser spot of an optical pickup is tracing. That is, the sense of eccentric acceleration can be judged on the level of a truck zero cross signal, the point used as eccentric acceleration max is a midpoint of a truck zero cross edge, and the point used as the eccentric acceleration 0 serves as an edge of a truck zero cross signal.

[0026] The eccentric detecting circuit in the optical disk unit of means 4 publication is the gestalt of other operations of an eccentric detecting circuit. That is, at least a truck changes the property of a phase compensating filter so that an optical pickup may be held just before a track jump. A hold of an optical pickup outputs a truck error signal. A truck error signal is incorporated according to the sampling rate defined beforehand. When the truck error signal first incorporated at time of day t (n-1) is set to TE (n-1) and the truck error signal incorporated by time-of-day t (n) is set to TE (n), an eccentric rate is TV(n) = {TE(n)-TE (n-1)}/{t(n)-t (n-1)}. (3)

It comes out and asks.
[0027] When the truck error signal similarly incorporated at the next time of day t (n+1) is set to TE (n+1), an eccentric rate is TV(n+1) ={TE(n+1)-TE (n)}/{t(n+1)-t (n)}. (4)
It asks.
[0028] That is, it is TV=deltaTE/deltat when sampling-time spacing is set to regularity =deltat. (5)
Therefore, eccentric acceleration is proportional to the variation of an eccentric rate, and is deltaTV=TV (n+1)-TV (n). (6)
It is expressed with eccentric acceleration AC**delta TV.
[0029] As mentioned above, the sense of eccentric acceleration and the information on magnitude can be acquired by sampling a truck error signal with a fixed time interval.
[0030] Moreover, if the track jump command from a control means is received, the track jump enable signal generating circuit in the optical disk unit of means 5 publication will receive the output signal from the direction of a track jump, the number of track jumps, and a disk roll control circuit to a spindle motor, and will set up the window about the direction and size of eccentric acceleration in the case of permitting a jump according to the table defined beforehand. Furthermore the sense and magnitude of eccentric acceleration from an eccentric detecting circuit are inputted, and only when it enters in the window where the value was set up, a track jump enable signal is outputted. The driver which moves the actuator of an optical pickup outputs the drive signal of an optical pickup actuator only after it receives the signal of this enable signal, jump instruction, and the jump direction. If the predetermined number of jumps is jumped, the driven optical pickup will draw a truck servo again, and will end a jump sequence.
[0031] Furthermore, according to the drive approach of the optical disk means 6 publication, a track jump can be carried out certainly.
[0032]
[Embodiment of the Invention] Hereafter, the application to CD-ROM is explained using drawing 2 , drawing 3 , and drawing 4 about the track jump method of the optical disk memory equipment which is the gestalt of operation of the first of this invention. In drawing 2 , 1 shows an optical disk, for example, CD-ROM, and 2 shows an optical pickup. First, when it explains from a data reversion system, 10 is an RF amplifier which amplifies the data signal of the minute amplitude which an optical pickup outputs for data processing, and 11 indicates the block which corrects the error of data to be the data slicer which makes binary the data which an RF amplifier outputs. 12 shows the interface which changes the output of a data slice error correction block into the data input output format for outputting to a host computer 13, and 13 shows a host computer. In order that 14 may read data by the constant linear velocity, the CLV servo block for changing the engine speed of a spindle motor on the inner circumference and the periphery of a disk is shown, and C4 shows the revolving-speed-control signal to a spindle motor.
[0033] Next, a control system is explained. The amplifier (henceforth amplifier) which generates the truck error signal showing the error of which 3 has from the truck which calculates the reflective signal from an optical pickup and the laser spot is tracing is shown. Here, when a truck error signal is set to 0 for convenience when [of explanation] an optical pickup occurs on a truck, the optical pickup has shifted to disk inner circumference from the truck currently traced and it has shifted to negative and a periphery, the truck error signal S1 used as forward shall be generated. The reflective signal of a disk is calculated and the laser spot of an optical pickup serves as a truck error signal generating circuit which generates the signal showing the error of which it has in the inner circumference or the direction of a periphery of a disk from the target truck. At least 4 is a phase compensating filter, and it calculates to a truck error signal so that a truck servo loop may serve as a desired transfer function. Based on this filter output, an actuator drive signal generating circuit drives an actuator through the pickup actuator driver 5 so that a truck error signal may be set to 0. 8 is an eccentric detecting circuit which detects eccentricity from the truck error signal S1, and the jump enable signal generation circuit of 9 generates reception and jump enable signal S4 for the eccentric information S3 and the jump direction C2 outputted from the control means which is not illustrated, C3 jumps, and the spindle roll control signal C4.
[0034] Next, the configuration of the eccentric detecting circuit 8 in the gestalt of the first operation and

the jump enabling generation circuit 9 is explained using drawing 3 and drawing 4 . First, in the eccentric detecting circuit 8, 81 shows the low pass filter which removes a high-frequency component from the truck error signal S1. The truck error signal removed in the high-frequency component is the truck zero cross comparator of 82, a party rate is carried out on the truck error signal level of an on-truck, 0 [i.e.,], and the truck zero cross signal S31 is generated.

[0035] Before the jump command C1 is outputted from a control means, the optical pickup is tracing a certain truck on an optical disk. In this condition, the truck error signal S1 is in about 0 condition. In this condition, even if it passes a filter 81, it is thought that the zero cross of the truck error signal S1 is frequently carried out by a noise component etc.

[0036] Next, if the jump command signal C1 is outputted from a control means, at least a truck [in / in the gain down signal generating circuit 83 / drawing 2] will issue fixed period gain down command S2 to the phase compensating filter 4. At least a truck will reduce the low-pass gain of a filter to the value set up beforehand, if the phase compensating filter 4 receives this gain down command S2. As for the value of this gain, it is desirable to decide beforehand that a servo does not separate.

[0037] Since servo gain falls, a truck error oppression ratio falls, and the amplitude of the truck error signal S1 becomes large. Therefore, carrying out a zero cross of the truck error signal S86 after filter 81 passage frequently under the effect of a noise is lost. The output S31 of the truck zero cross comparator 82 is outputted in this condition as a binary signal which synchronized with the disk eccentricity period as shown in drawing 4 .

[0038] Next, the jump enable signal generation circuit 9 receives this truck zero cross signal S31, and judges the sense and the maximum point of eccentric acceleration. That is, when the truck zero cross signal S31 is 0 level, it is shown that an optical pickup is located in the inner circumference side of a disk to a truck, and when a truck zero cross signal is 1 level, it is shown that the optical pickup is located in a disk periphery side to a truck. Moreover, as shown in drawing 4 , the part of the edge of the zero cross signal S31 shows that eccentric acceleration serves as zero. In the gestalt of the first operation, the magnitude of eccentric acceleration is not detected but extracts only the information on the max of acceleration, the minimum point, and the sense. The track jump enable signal generating circuit 9 of the gestalt of this operation receives reception, the jump direction C2 from a control means and C3 jump trucks, and the roll control signal C4 of the spindle motor from a CLV servo block for the zero cross signal S31 from the eccentric rate detecting circuit 8. This is a command signal to the driver of a spindle motor with a certain magnitude.

[0039] First, the jump direction setting signal C2 from a control means presupposes that it was what the jump direction orders the jump turned to a periphery from inner circumference.

[0040] In the gestalt of this operation, in order to eliminate the phenomenon of jump driving backward by eccentricity as much as possible, when eccentric acceleration is suitable inside, namely, when it is the jump direction and hard flow, it is good to perform a jump. From a formula (1) and a formula (2), since, as for the eccentric phase, i.e., the phase of a truck error signal, and the phase of eccentric acceleration, it turns out that it is shifted 180 degrees, a jump is performed in the forward part of a truck zero cross signal. Although considered the rising edge neighborhood of a truck zero cross signal, since the suitable timing of jump initiation cannot predict the rising edge of a truck zero cross beforehand immediately after the jump instruction from a control means comes out, it waits for the following rising edge, or outputs jump enabling from a falling edge in a certain place which carried out time amount progress. That is, in this case, according to the data memorized by internal ROM93, the track jump enabling generating circuit 9 generates a window signal S94 so that jump enabling S4 may be generated from the standup of the truck zero cross S31, and falling in a certain place which carried out time delay progress. Although the example of CD-ROM was shown here, this window is suitably set up from the property of drive equipment, the property of an optical disk, etc.

[0041] Drawing 4 shows the timing of the signal in the gestalt of this operation. After waiting for a certain time delay set up to falling of the first truck zero cross S31 in the window setting circuit 92 after the jump command C1 is set to 1 level, jump rice Boolean S4 is outputted. When the standup of a truck zero cross is furthermore detected ahead of falling of a truck zero cross, the window is generated so that

it may output jump enabling at the time. Thereby, the magnitude of the eccentric acceleration at the time of jump initiation can reduce to zero possibility of being passed by eccentricity since the rate that eccentric acceleration becomes the jump direction and reverse becomes high, during near and a jump.
[0042] The actuator driver 5 generates the drive signal to which it carries out movable [of the actuator 6] in the place which received jump enable signal S4 according to the jump command from a control means, and a track jump is performed.
[0043] Next, the gestalt of operation of the 2nd of this invention is explained using drawing 2 , drawing 5 , and drawing 6 . In drawing 2 , 1 shows an optical disk like the gestalt of the first operation, and 2 shows an optical pickup. 10 is an RF amplifier which amplifies the data signal of the minute amplitude which an optical pickup outputs for data processing, and 11 indicates the block which corrects the error of data to be the data slicer which makes binary the data which an RF amplifier outputs. 12 shows the interface which changes the output of a data slice error correction block into the data input output format for outputting to a host computer, and 13 shows a host computer. In order that 14 may read data by the constant linear velocity, the CLV servo block for changing the engine speed of a spindle motor on the inner circumference and the periphery of a disk is shown, and C4 shows the revolving-speed-control signal to a spindle motor. Moreover, the generation amplifier of the truck error signal S1 showing the error of which 3 has from the truck which calculates the reflective signal from an optical pickup and the laser spot is tracing is shown. Here, when a truck error signal is set to 0 when the expedient top optical pickup of explanation occurs on a truck, the optical pickup has shifted to disk inner circumference from the truck currently traced and it has shifted to negative and a periphery, the truck error signal S1 used as forward shall be generated. At least 4 is a phase compensating filter, 5 shows a pickup actuator driver and 6 shows a pickup actuator.
[0044] 8 is an eccentric detecting circuit which detects eccentricity from the truck error signal S1, and the jump enable signal generation circuit of 9 generates a reception jump enable signal for the eccentric information S3 and the jump direction C2, C3 jumps, and the spindle roll control signal C4.
[0045] Next, with drawing 5 and drawing 6 , are and the eccentric detecting circuit 8 and the jump enabling generation circuit 9 in the gestalt of operation of the second of this invention are explained.
[0046] In the condition that a truck servo starts first and the optical pickup follows the truck, it is hard to say that it expresses the acceleration of eccentricity under the effect of a high region noise even if the variation in the minute time interval of the truck error signal S1 lets a filter pass. Then, if the jump command signal C1 is outputted from a control means, the hold signal generating circuit 84 will output a hold signal S2 at least for a truck to the phase compensating filter 4. If a hold signal S2 is received, at least a truck will change the phase compensating filter 4 into the property that a low-pass property, i.e., the high-frequency component of an input signal, is omitted, and the property cannot be followed at a steep change.
[0047] Consequently, since flattery actuation of an optical pickup is held to truck eccentricity, the eccentricity itself comes to appear in the truck error signal S1.
[0048] The eccentric acceleration calculation circuit 85 samples the filtered truck error signal S86 by fixed time interval deltat, and computes eccentric acceleration. That is, as shown in drawing 6 , the truck error signal S1 is held to every fixed time interval deltat, the operation of eccentric rate V=deltaTE/deltat and acceleration =delta V/delta t is performed, and the magnitude and the direction of acceleration are searched for.
[0049] If it explains taking the case of drawing 5 , the value of the truck error which sampled the truck error signal S1 outputted by the pickup hold at intervals of deltat will presuppose that they were TE (n-1), TE (n), and TE (n+1), respectively. The eccentric rate in each sampling time is TV(n) =TE(n)-TE (n-1). (7)
TV(n+1)=TE(n+1)-TE(n) (8)
It is expressed.
[0050] Moreover, since it is expressed with the variation of an eccentric rate, acceleration is acceleration =deltaTV=TV(n+1)-TV (n). (9)
It becomes.

[0051] The sign of deltaTV shows the direction of acceleration. Since it is TV(n) >TV (n+1) in the example of drawing 6 , deltaTV serves as negative and it turns out that acceleration is going in the direction of inner circumference from the periphery of a disk. Moreover, the magnitude of eccentric acceleration is called for by |TV(n+1)-TV(n) |. Thus, eccentric acceleration is computed from a truck error signal, and the eccentric acceleration direction signal shown by S32 of drawing 5 and the amount signal of eccentric acceleration shown by S33 of drawing 5 are outputted to the jump enabling generation circuit 9.

[0052] Next, the jump enable signal generating circuit 9 detects the spindle roll control signal C3 from a spindle control section to the jump direction C2 from a control means and C3 jumps, and a pan, and sets the window for enable signal S4 as them.

[0053] In the gestalt of this operation, if it is jumping a track jump from inner circumference to the sense of a periphery, in order to eliminate the possibility of driving backward on the pickup jump direction by eccentricity as much as possible, it is appropriate to perform a jump to timing with the eccentric acceleration near 0. Moreover, by starting a jump from before a certain extent from which eccentric acceleration becomes the jump direction and reverse, after eccentric acceleration becomes the jump direction and reverse, a window which starts a jump in the large range can be set up rather than it begins a jump. Using the above ways of considering, the jump enable signal generating circuit 9 determines the sense of the eccentric acceleration which permits a track jump according to the contents of the table ROM shown in 93 of drawing 5 from the control signal C4 of the jump direction C2, C3 jumps, and a spindle motor, and the range of magnitude, and sets them up as a window as shown in drawing 6 . If the value of the signal S33 which shows the direction signal S32 of the eccentric acceleration from an eccentric detecting circuit and the magnitude of acceleration enters in this window, track jump enable signal S4 will be generated.

[0054] The actuator driver 5 generates the drive signal to which it carries out movable [of the actuator 6] in the place which received jump enable signal S4 according to the jump command from a control means, the pickup actuator 6 is kicked, and a track jump is performed.

[0055]

[Effect of the Invention] As explained above, in order that the track jump device of the optical disk memory equipment by this invention may perform a track jump to the optimal timing by carrying out the monitor of the condition of disk eccentricity, it eliminates the bad influence of the track jump under the effect of eccentricity as much as possible, and performs stability and a positive track jump, and its establishment which an optical pickup reaches to the target truck improves. That is, the access time for accessing to the target data is shortened, and it reads, or write-in actuation is accelerated. It is thought that the track jump method of this invention has the effectiveness that it is big when the frequency of short-distance random access is high, in the drive of a high-speed engine speed especially with the large and eccentricity of media.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] The block diagram of the truck control section of conventional optical disk memory equipment.
[Drawing 2] The block diagram of the truck control section of the optical disk memory equipment in this invention.
[Drawing 3] They are a **** eccentricity detecting circuit and an enable signal generating circuit block diagram to the gestalt of operation of the first of this invention.
[Drawing 4] It is a **** signal timing chart to the gestalt of operation of the first of this invention.
[Drawing 5] They are a **** eccentricity detecting circuit and an enable signal generating circuit block diagram to the gestalt of operation of the second of this invention.
[Drawing 6] It is a **** truck error signal Fig. to the gestalt of operation of the second of this invention.
[Drawing 7] The conceptual diagram of the eccentricity in an optical disk unit.
[Description of Notations]
1 Optical Disk Memory
2 Optical Pickup
3 Truck Error Amplifier
4 Phase Compensating Filter
5 Actuator Driver
S5 Drive signal
6 Pickup Actuator
7 Spindle Motor
8 Eccentric Detecting Circuit
81 Low Pass Filter
82 Truck Zero Cross Comparator
83 Gain Down Signal Generation Circuit
84 Hold Signal Generation Circuit
85 Eccentric Acceleration Calculation Circuit
S86 Truck error signal which a low pass filter 81 outputs
9 Jump Enabling Generation Circuit
91 Jump Enabling Judging Circuit
92 Window Setting Circuit
93 Read Only Memory
S94 Window signal
10 RF Amplifier
11 Data Slice and Error Correction
12 Interface
13 Host Computer
14 CLV Servo

S1 Truck error signal
S2 A phase compensating filter gain rise or hold signal
S3 Eccentric acceleration signal
S31 Truck zero cross signal (eccentric acceleration phasing signal)
S32 The eccentric acceleration direction signal
S33 The amount signal of eccentric acceleration
S4 Track jump enable signal
C1 Jump command signal
C2 The jump direction signal
C3 The number signal of jumps
C4 Spindle control signal

[Translation done.]

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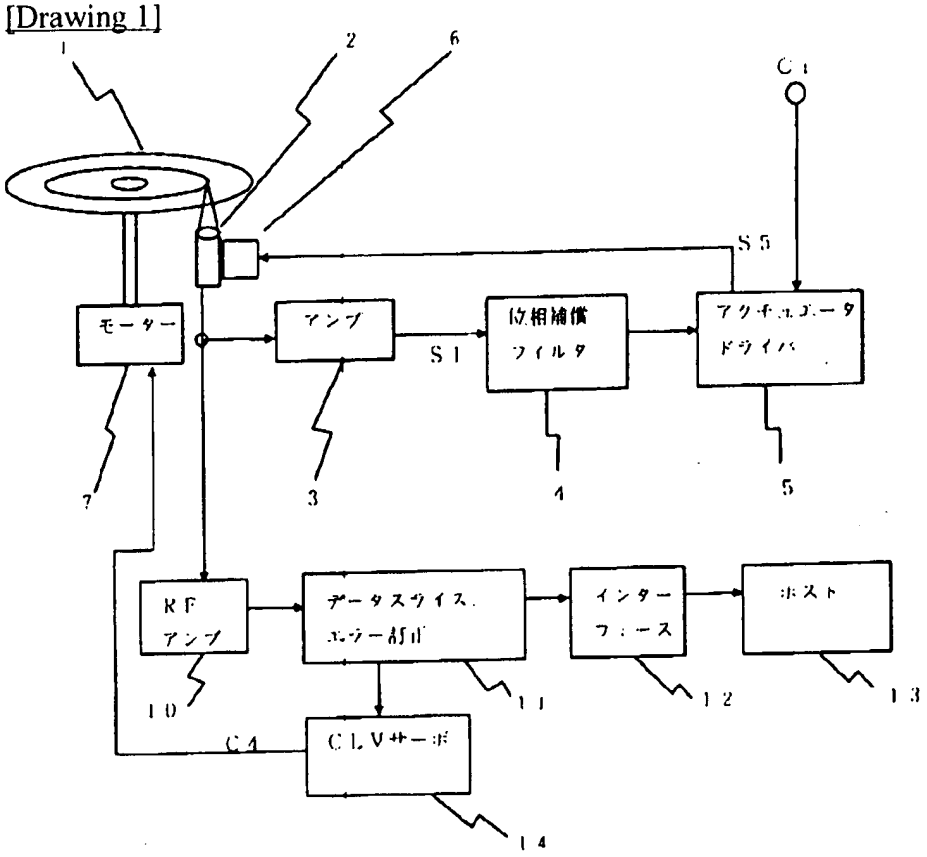
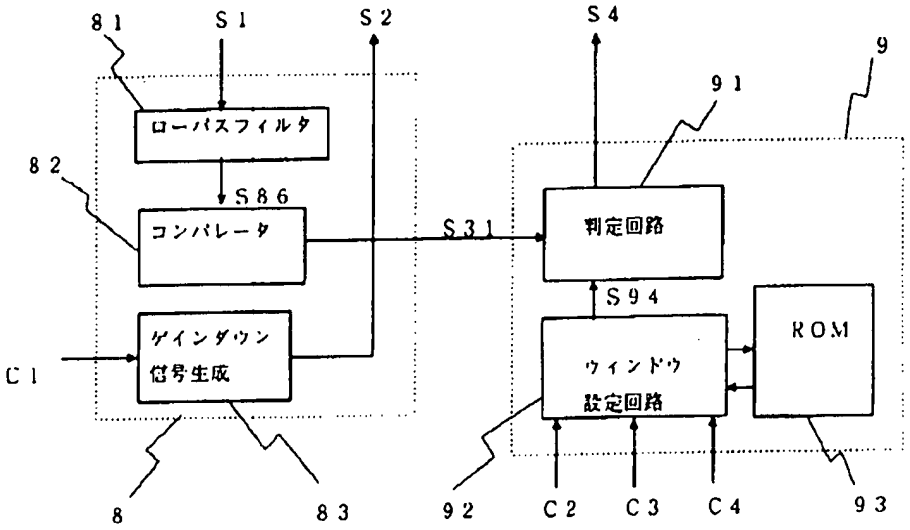
DRAWINGS

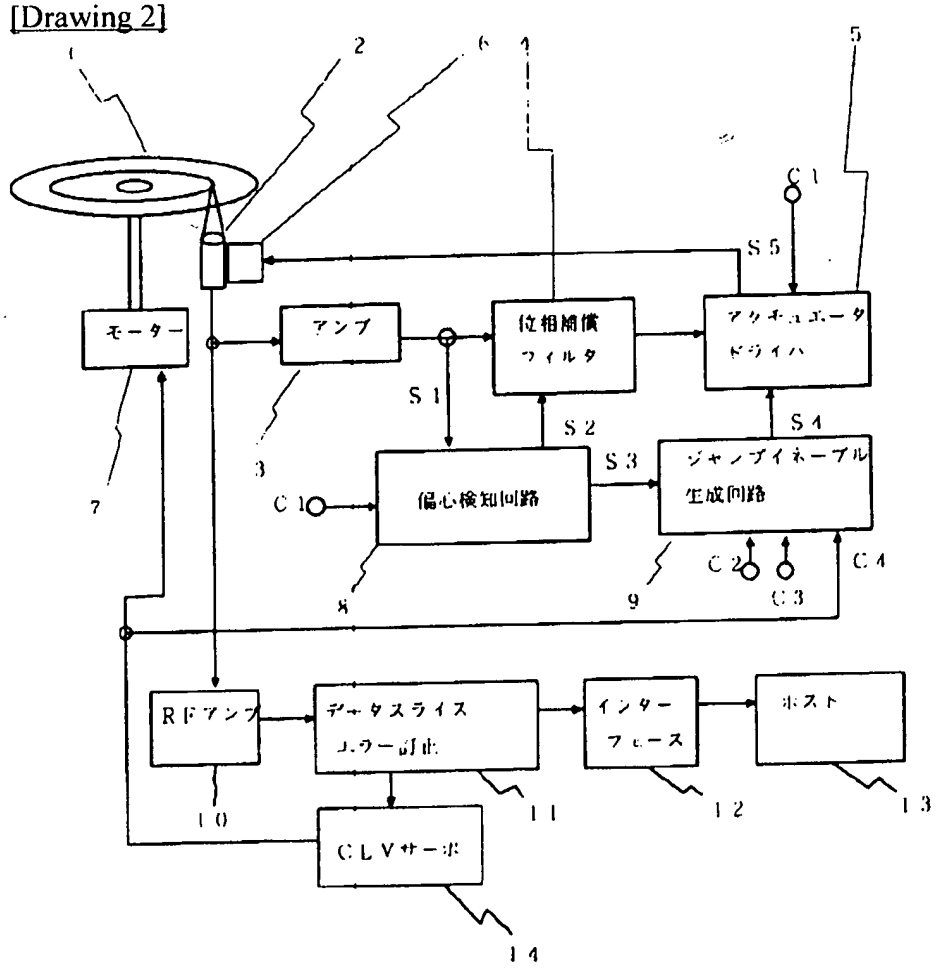
[Drawing 1]



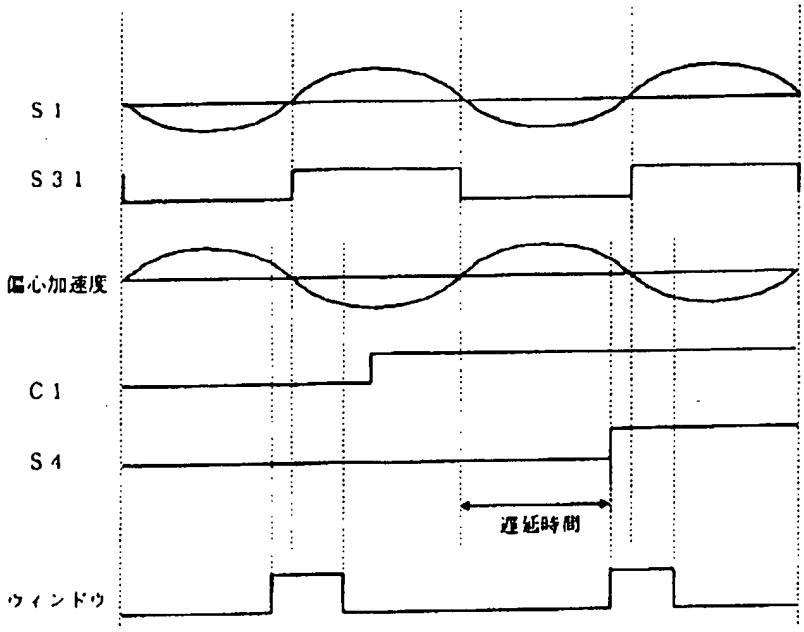
[Drawing 3]



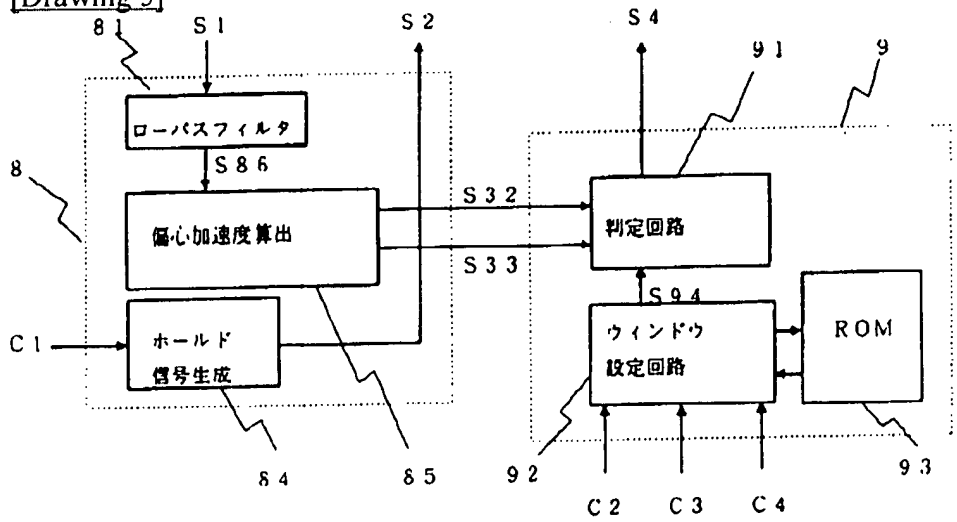
[Drawing 2]



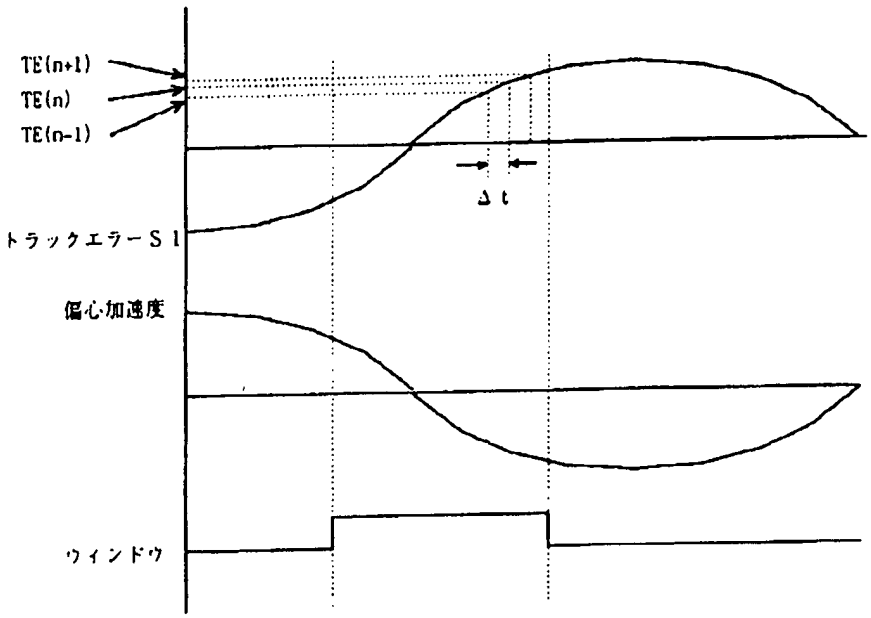
[Drawing 4]



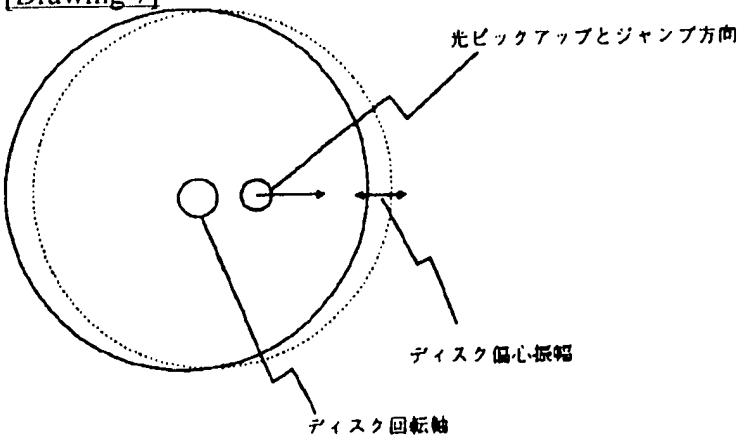
[Drawing 5]



[Drawing 6]



[Drawing 7]



[Translation done.]